

**CLAIMS**

I claim:

1. An apparatus for selectively interacting with electrically excitable tissue of a patient, said apparatus comprising:

an implantable pulse generator having a number of output sources that transmit electrical signals;

an implantable electrode array having a number of electrodes, wherein the number of electrodes is greater than the number of output sources; and

an extension unit coupled between the implantable pulse generator and the implantable electrode array and configured to electrically connect the output sources to a portion of the electrodes.

2. The apparatus of claim 1, wherein the extension unit comprises an array of programmable switches.

3. The apparatus of claim 1, wherein the implantable electrode array includes at least one biomedical sensor.

4. The apparatus of claim 1, wherein the electrodes are arranged in a line.

5. The apparatus of claim 1, wherein the electrodes are arranged in a multi-dimensional array.

6. The apparatus of claim 1, wherein a first distance between the implantable pulse generator and the extension unit is greater than a second distance between the extension unit and the implantable electrode array.

7. An extension unit that electrically connects an implantable pulse generator having a number of output sources to an implantable electrode array having a number of electrodes, wherein the number of electrodes is greater than the number of output sources, the extension unit comprising:  
an array of programmable switches, each switch being connected between one output source and at least a portion of the electrodes.

8. The extension unit of claim 7, further including:  
a programming logic unit, coupled to the array of programmable switch, that receives programming signals and produces signals for configuring the programmable switches.

9. The extension unit of claim 7, wherein the array of switches comprises micro-relay switches that retain their switching state after power has been removed.

10. The extension unit of claim 7, further including an array of wave shaping circuits coupled to the array of switches and the output sources.

11. The extension unit of claim 10, wherein at least some of the wave shaping circuits are configured to change the frequency of signals received on the output sources.

12. The extension unit of claim 10, wherein at least some of the wave shaping circuits are configured to change the amplitude of signals received on the output sources.

13. The extension unit of claim 7, wherein the array of switches comprises mechanically adjustable switches.

14. The extension unit of claim 7, wherein the array of switches comprises magnetically adjustable switches.

15. A method of selectively providing electrical therapeutic treatment to a patient comprising the steps of:

implanting an electrode array having a number of electrodes near electrically excitable tissue of a patient;

implanting a pulse generator having a number of output sources in the patient, the number of output sources being less than the number of electrodes;

implanting an extension unit between the electrode array and the pulse generator, the extension unit electrically connects the output sources to a portion of the electrodes;

determining which electrodes are physically positioned to provide optimal therapeutic treatment; and

configuring the extension unit to electrically couple the output sources to the electrodes identified in the determining step.

16. The method of claim 15, wherein the extension unit includes an array of programmable switches; and the configuring step comprises adjusting the positions of the switches.

17. The method of claim 15, wherein the determining step is performed by the patient.

18. A method of selectively measuring diagnostic information from a patient using an array of biomedical sensors, the method comprising the steps of:

implanting an array having a number of biomedical sensors in a patient;

implanting a diagnostic device having a number of input sources in the patient, the number of input sources being less than the number of biomedical sensors;

implanting an extension unit between the array of biomedical sensors and the diagnostic device, the extension unit electrically connecting the input sources to a portion of the biomedical sensors;

determining which biomedical sensors are physically positioned to provide optimal diagnostic information; and

configuring the extension unit to electrically couple the output sources to the biomedical sensors identified in the determining step.

19. The method of claim 18, wherein the array of biomedical sensors includes an electrode.

20. The method of claim 18, wherein the extension unit includes an array of programmable switches; and the configuring step comprises adjusting the positions of the switches.

21. The method of claim 18, wherein the determining step is performed by the patient.

22. The method of claim 19, further including the step of providing therapeutic treatment to the patient with the electrode.

23. An extension unit that electrically connects a diagnostic device having a number of input sources to an array of biomedical sensors, wherein the number of biomedical sensors is greater than the number of input sources, the extension unit comprising:

an array of programmable switches, each switch being connected between one input source and at least a portion of the biomedical sensors.